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A triarchal instruction model: integration of principles from Behaviorism, Cognitivism, and Humanism

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Abstract

This article proposes a *Triarchal Instruction Model* in which principles of *behaviorism, cognitivism*, and *humanism* are integrated and transformed via the *components* involved in instruction: *objective, assessment, material, method, teacher*, and *student.* Moreover, different levels of learning readiness–beginning, intermediate, and advanced–are included as important considerations in instructional design based on the instructional model. Specific examples reflecting the principles of each discipline are given. This *Triarchal Instruction Model* offers a comprehensive framework for instructors in their curriculum design and for theorists in their analysis of various instructional approaches.
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Keywords: operant conditioning; hierarchy of learning; discovery learning; meaningful learning; ZPD, hierarchy of needs; instruction mode;

1. Introduction

In the field of instruction, a variety of instructional approaches has evolved from distinct theories; for instance, *programmed instruction* from behaviorism, *discovery learning* from cognitivism, and *open classroom* from humanism. It is difficult to identify exactly which specific approach practitioners adopt in their instructional settings, since many may adopt aspects of various approaches to meet their individual needs. What we need in the field of instruction at the moment is a comprehensive model where all the indispensable elements involved in effective instruction are integrated. Most individual approaches developed from principles of behaviorism, cognitivism, or humanism contribute, to some extent, to instruction with their effectiveness confined to certain circumstances. For instance, *discovery learning* can be most effective for learners at the intermediate level of readiness. Even in a setting designed for discovery learning, it is relatively difficult for beginners to discover things; likewise programmed instruction is not effective for intermediate learners. Instruction per se is a multi-dimensional undertaking where the level of readiness of learners, features of subject matter, objectives, assessments, learning material, or methods adopted should all be taken into account. Instruction that strictly adheres to any single theory

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cannot meet the needs of every instructional setting.

2. The components

This paper proposes an instruction model called the *Triarchal Instruction Model* by first specifying the general principles in *behaviorism, cognitivism/constructivism, and humanism*. These principles will be employed as three *ingredients* involved in the three pairs of *components*. Next, the paper elaborates on the dynamic relationships of these *ingredients* and the three pairs of *components* in conjunction with varying levels of learner readiness. Finally the paper offers predictions based on the model for further exploration.

Instruction in the 19th century was generally teacher oriented; teachers dominated all classroom activities. In the 20th century instruction became material oriented; organizing teaching material and presenting it was the major concern. Now, in the 21st century instruction is increasingly student oriented; the individual needs and uniqueness of students are treated as the highest priority. Clearly, it is inadequate for instruction to focus exclusively on only a single aspect of instruction. Instruction cannot be complete (i.e., to be of any effect) without consideration of all the components involved in the instructional setting taken as a whole. These *components–objective-assessment, teaching material-method,* and, *teacher-student*–should all be carefully attended to and examined concurrently. Thus for each *component,* there are three *ingredients* as illustrated in Figure 1 below.

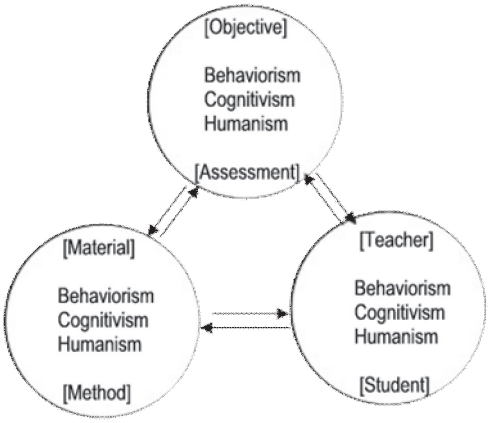

Figure 1. Three ingredients in three pairs of components

Note that there are multiple correspondences or interactions among the three pairs of *components*, and also among the three *ingredients* in each *component*. For example, the *ingredients* in *material* may correspond to and/or interact with those in *objective*; the *behavioral ingredient* covered in *material* may be included in the *behavioral* realm in *assessment*, and likewise for the *cognitive ingredient* in the *cognitive* realm and the *humanistic ingredient* in the *humanistic* realm. The features of the three distinct *ingredients* as well as their dynamic relationship with the six *components* are addressed below.

3. The ingredients

In stimulus-response association (S-R), *classical conditioning* mainly focuses on the combination of different stimuli (e.g., ringing bell and meat powder for the dog in Pavlov's classical conditioning experiment), whereas *operant conditioning* places the emphasis on the reinforcement posterior to the desired responses (R-R); e.g., pressing the bar followed by the reception of food as reinforcement for hungry mice in *instrumental conditioning* experiments (Skinner, 1935). The S-R or R-R (Response-Reinforcement) paradigm, as well as its chained associations in behavioral shaping, constitutes the infrastructure of behaviorism, which can also be referred to as a

system in which all that is specific, objective, observable, and measurable are dealt with. Applications may include *programmed instruction, computer assisted instruction (CAI)*, and *mastery learning* among others. Thorndike's (1898) three laws of learning–readiness, trial and error, and effect–are basically applications of the principles of *operant conditioning*, which specifies the conditions for learning to occur (i.e., besides reinforcement as the law of effect, the required state of readiness and the trial and error period are essential). A French instructional psychologist, Robert Gagne (1985), proposed as a model a *hierarchy of learning* (i.e., from signal learning, S-R, S-R chained associations, language, multiple discrimination/differentiation, conceptual learning, principle learning, and problem solving), coupled with the integration of internal conditions as readiness and external events of instruction. Such a hierarchy strictly follows the doctrine of behaviorism; that is, learning tasks are differentiated from the simplest to the most complex. If, for example, students fail to learn a certain *concept*, the instructor must go back to the previous stage (*multiple differentiation* or *discrimination*) and help students master it, rather than keep on reviewing the target *concept*, since conceptual learning is one stage higher than multiple differentiation in the hierarchy. By contrast, when students have already mastered the *concept*, the instructor can then move to the *principle* (a stage higher than that of *concept* in the learning hierarchy). Such sequential composites (as from simplest to the most difficult) reflect the essence of behaviorism as being of a step-by-step, easy-to-hard, simple-to-complex organization by nature. Though there have been widespread doubts regarding the validity of behaviorist principles, most instructors nevertheless believe them to be effective at least in the initial stage of learning simple tasks.

Cognitivism (or constructivism) mainly deals with the cognitive processes involved in learning, inclusive of induction, deduction, rule finding, law discovering, and pattern recognition among others. Unlike behaviorism, cognitive perspective has to do with schemata development (rather than knowledge accumulation or collection), and gaining understanding is of prime importance in the course of discovery, which is what Bruner's (1966) *discovery learning* model suggests. Bruner contends that students may achieve discovery on the basis of understanding if what is learned (or learning materials) can be presented by following the principles of *organization*, *motivation, ordering*, and *reinforcement*. Bruner is confident that one can teach anyone anything if the methodology is appropriate. To facilitate students' understanding (meaningful learning), teachers may present *advanced organizers* to the students at the beginning of instruction, as suggested by David Ausubel (1978). An advanced organizer is an instructional device in which what has been learned is combined with what is yet to be learned. Such meaningful learning can be inspiring to those teachers who do the most talking in a given instructional setting.

Humanistic learning, as distinct from behaviorism and cognitivism, mainly focuses on the psychological needs and values of individual learners, rather than on the process of learning. The humanistic approach is concerned not about how or what one learns in instructional settings, but about why one learns a concern that relates more to motivation of learning. This can best be demonstrated by Maslow's (1943) *hierarchy of needs*, and Rogers' (1959) *student-centered* mode of thinking. For Maslow, students can become spontaneous learners if their basic needs (including physiological, and psychological–security, attribution, love, or dignity) are satisfactorily met, since the need to know or to learn is followed by the need for self esteem or respect. If the needs in the lower hierarchy are not met, then the needs in the higher hierarchy cannot be activated and fulfilled. Thus, if students suffer failure in learning, the teacher must take into account their physiological or psychological needs, rather than their learning skills. By the same token, Rogers believes that students can achieve optimal learning results if they are treated by significant people in their environment with *unconditional regard and respect, genuineness, and empathy*, and if they are allowed to take full responsibility for their own learning Taking responsibility of one's own learning is a feature of the *student-centered* oriented approach. The humanistic perspective can be characterized as mainly concerned about individual needs, values, motivations, and so on. It is difficult to examine the validity of the humanistic perspective in learning partly because humanistic ideas are philosophical and abstract, thus not readily objectively verifiable. Nevertheless, the humanistic perspective of learning plays an indispensable role in the course of instruction as present in Bloom's (1959) t*axonomy of instructional objectives* where individual needs, values, and motivation have much to do with the affective domain, the other two being the cognitive domain and the psychomotor domain. It is noteworthy that the *Triarchal Instruction Model* borrows ideas from these three approaches–behaviorism, cognitivism, and humanism–and conceives them as indispensable ingredients within each *component* involved in effective instruction. These three *ingredients* are interdependent on one another, and there can be no distinct lines among them. The ingredient of one method on the basis of one school of thought may also involve

other ingredients from other schools of thought. For example, there can be a behavioral ingredient in a cognitive ingredient or a humanistic ingredient.

3.1. Three ingredients in objective-assessment

From Bloom's learning objectives, there are roughly three domains: cognitive, affective, and psycho-motor. These three domains can, to some extent, reflect or correspond to ingredients in behaviorism (psycho-motor domain), cognitivism (cognitive domain), and humanism (affective domain). Just as the field of psychology cannot be complete if any one of the three approaches (behaviorism, cognitivism, and humanism) is left unemployed or isolated, learning objectives are incomplete if one of the cognitive, affective, and psycho-motor domains is left unattended to. The ingredients in the objective-assessment component are indicated in Figure 2 below.

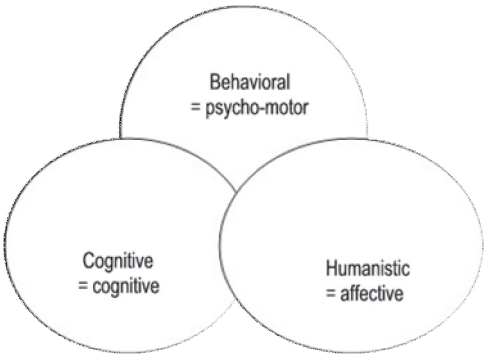

Figure 2. Three ingredients in the objective-assessment component

It is noteworthy that the inclusion of the three domains is not the sheer extension of learning objectives, but the integration and consolidation of what is learned. In other words, learning results can be intensified through the mutual support among the three domains; the cognitive aspect of learning among students can be reinforced by their positive affects toward learning, and the application of what is learned cognitively may also reinforce and induce positive feeling (affect), and propel further learning. These three domains can be regarded as ingredients of an interactive loop, with each one inducing another. There are sub-categories in each of the three domains, as the criteria for all the functioning of other components (*assessment, teacher, student, material, and method*). First, for the cognitive domain, Anderson and Krathwohl (2001) modified Bloom's original model and proposed six sub-categories for the cognitive domain (from simple to complex in the hierarchy below): *remembering, understanding, applying, analyzing, evaluating,* and *creating*. The sub-categories are characterized by their hierarchical nature. Note that students' creativity is the ultimate objective of instruction in cognitive domain, but in order to help students reach such a goal, the teacher needs to lead students through *remembering, understanding, applying, analyzing* and *evaluating* what is learned. Further, to facilitate *remembering*, one must first seek *understanding*. And to intensify one's *understanding*, one must manage to *apply* what is learned, and to facilitate *evaluation*, one must be provided with opportunities to exert *analytic* capacity (e.g., ability of looking at things from different angles). *Creativity* is always rooted in the capability of *evaluation*.

The affective domain is more concerned with *values*, or more precisely perhaps with *perception of value issues* (as related to humanistic element). This domain plays a dominant role in motivation, and yet it is often ignored in cognitive-oriented instruction. There have been cases where students may display great cognitive performance, yet show little interest in what they learn, and that may impede further learning. On the other extreme, there have also been cases where students, though less competent, are inspired in instructional settings characterized by affective concern. Again, positive affective states will emerge if learners get to know more, and in more depth, material in the cognitive domain and if they can be given opportunities to act out what they learn in the psychomotor domain. Thus

we see the mutual interdependence among these three domains. The affective domain also manifests subcategories from *receiving, responding, valuing, organizing and conceptualizing* to *characterizing by value or value concept* (Kratwohl, Bloom & Masia, 1964). Students will have to display their willingness to learn by *receiving*, before they can do any *responding*, and then learning can gradually become part of students' *value system* on the basis of *value organization and conceptualization*. Instruction cannot be regarded as simply *receiving* and *responding* for instrumental purposes (which can easily be accomplished by Skinner's reinforcement contingency scheme), but instead, students must be led to learn actively for an integrative motive, synonymous to inner drive and the most powerful source of learning.

The psycho-motor domain is the last, but not the least, domain of learning objectives, the simplest of which was suggested by Dave (1975). This domain essentially draws attention to the fundamental role of imitation in skill acquisition. This domain also plays a key role in both motivation and knowledge acquisition in that students can refresh what they have just learned by applying it to daily life situations, thus consolidating what they have learned. On the other hand, student motivation can be aroused by offering students opportunities to experience what they learn through kinesthetic activities, which is what operational thinking initiated by Jean Piaget (1958) is all about. The psycho-motor domain, like cognitive and affective domains, also manifests subcategories from *imitation, manipulation, precision, articulation, to naturalization* (Dave, 1975). Note that *imitation* in the psycho-motor domain can best be executed through behaviorist principles (*programmed instruction*, step by step, from the simplest to the most difficult). *Manipulation* and *precision* may refer to active trial and error on the part of the learners, quite consistent with the law of *trial and error* in Thorndike's framework. *Naturalization* refers to mastery of the psycho-motor skills, a series of automatic response chains without conscious effort involved. Only when learners reach *naturalization* can they display *creativity*, the ultimate stage of cognitive domain.

Assessment is widely regarded as contributing to learning if properly administered and handled. According to the *Triarchal Instruction Model*, assessment can be complete when cognitive, affective, and psycho-motor ingredients are included. For the cognitive ingredients, as indicated in the cognitive domain (*remembering, understanding, application, analysis, evaluation, and creativity*), assessment for each of the sub-categories can be conducted through the so-called *Taxonomy Table*, in which the items are produced on the basis of the combination of the objective and the content. It is suggested from the model that the more advanced sub-categories in the cognitive domain (such as *application, analysis, evaluation*, and *creativity*) must somehow be included in cognitive assessment via items regarding real-life problem solving. Assessment in the affective domain shall also be conducted to make assessment complete, which can be done by affective scales related to learning in general and the sub-categories such as *receiving, responding, valuing, organizing and conceptualizing*, to *characterizing by value or value concept* in particular, as is normally done in formative assessment through which learners' attitudes toward each element in the instructional settings can be reflected. Besides, learners must be allowed to express their self reflection regarding feeling, expectation, inspiration and sense of achievement in the course of learning, that is, learners are encouraged to keep a diary or take notes of what happened in their learning.

3.2. Three ingredients in material-method

The design of teaching materials should encompass the cognitive domain (elements of cognitivism), the affective domain (elements of humanism), and the psycho-motor domain (elements of behaviorism). Ingredients in the materials-methods component are indicated in Figure 3 below.

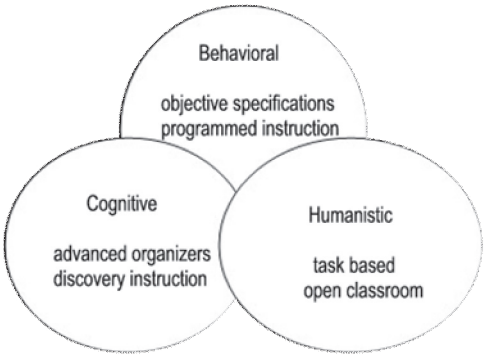

Figure 3. Three ingredients in the material-method component

Teaching materials may begin, in general, with a table of contents and, in particular, with an outline for each chapter in which may be worded as *In this chapter you will learn 1)…, 2),….* This arrangement will enable learners to have a clear picture of what is to be learned; that is, the objectives of the learning materials are specified, thus facilitating goal-setting for students. From a cognitive perspective, advanced organizers with reference to the topics included should also be presented in the very beginning of the material (following the *table of contents*), to facilitate activating learners' prior experience. The advanced organizers may cover the statements of the relationship between what they have already learned and what is to be learned, which may also include different formats for learners of different levels; that is, for beginners the format of the advanced organizers can be a series of comic strips, whereas for advanced learners, more weight on symbolic representation is required.

The main text of teaching material should be presented from simple to complex, from easy to difficult, and from concrete to abstract on the basis of Bruner's organizing principles, and the exercise problems (preferably real life problems) included in the material must also follow the organizing principles accordingly. Preferably, assessment of certain topics based on the objectives can be simulated in the material, something that may enhance student motivation. In addition, teaching material can be replete with problems that require application of what is learned. *Evaluation* and *creativity* can be reflected in the performance of these exercises.

As to the affective domain, teaching materials may include short stories of great figures relevant to the topic of the target field, which may not only manifest the constructive processes involved in learning the topic, but also stimulate emotional or affective responses, thus facilitating further study of the material. Additionally, a brief introduction of learning strategies must be covered in the teaching material as an independent unit to make the material more attractive as suggested by humanism.

Finally, in the psycho-motor domain, group activities with reference to the topic should be included in the end section of a given chapter, which may serve to consolidate what is learned in the cognitive domain or affective domain. In sum, the teaching material, as under the framework of the present model, must include *a table of contents, things one is going to learn, advanced organizers, contents, short stories, strategies, practical exercises, and group activities*, among other things.

Regarding *teaching methods*, the universal rule for effective instruction is to help students combine what is old with what is new. This rule actually applies to cognitivsm/constructivism or even to behaviorism and humanism, but with different implications. From the cognitive perspective, teaching methodologies must be implemented on the basis of the universal rule mentioned above. Advanced organizers in meaningful learning seek to assist students to transfer or apply what they have already learned to what they are about to learn. Advanced organizers can also help teachers clarify the new concepts students will be exploring, identify what students have already learned, and establish the connection between the two (e.g., concept mapping). Thus, teachers must know what students have already learned about the subject that is being taught with a view to teaching it effectively.

Such a *meaningful learning* model is inspiring, especially in classes where teachers will do mostly verbal instruction. By contrast, *discovery learning,* as the term implies, is an inquiry-based learning approach, which has

been most notably applied in problem-solving situations. In *discovery learning*, students employ their own prior knowledge or experience to discover the rules or truths in what is being learned. Such an instructional process is manifested in learning settings that are personal, internal, and constructivist. As Bruner indicates, emphasis on discovery in the course of learning will lead students to be constructionists, to help them organize what is exposed to them, and to discover regularity and interrelatedness.

To take into account the sub-category in the *objectives* of the cognitive domain, the constructivist mode of instruction manifests itself as each individual 'constructs' knowledge instead of receiving it from others; constructivist classrooms engage learners actively in the learning process. Learners experience learning by doing through exploration, discovery, and invention during which learners are encouraged to think and explain their reasoning, which helps the accomplishment of *understanding, application, evaluation and creativity*. Part of the reason that this approach has never received worldwide acceptance and recognition is that it does not take into full account individual differences in competence. As to the behavioral instruction, *programmed instruction*, stresses the use of rewards and punishments, operant conditioning, reinforcing and reinforcement schedules for the learning materials arranged in terms of successive approximations of the learning units from easy to difficult, simple to complex.

Such a behavioral mode is thought to be especially effective for beginners, but this can also be ineffective (though there is a likelihood of functional autonomy). When reinforcement stops, so does learning. Such external motivation (instrumental orientation) resulting from reinforcement proceedings may actually impede further learning. Thus, in order to trigger learners' intrinsic motivation, instructional arrangements must take into account the adoption of humanistic approaches right after behaviorist approaches.

From humanist perspective, *cooperative learning* refers to the instructional arrangement of small groups so that learners may work together to maximize learning results. In *cooperative learning* situations, learners are placed in non-competitive situations, where every single individual is given the opportunity to succeed in consideration of needs and individual differences–one's own and those of others. Face-to-face interaction can be promoted to refine social skills, and, through *group processing*, a positive interdependence among learner goal attainments can be realized by all the group members–every student may sense that he or she can accomplish his or her learning objectives on the condition that other students in the learning group can also reach theirs. All this may somehow manage to stimulate intrinsic motivation for further learning.

As suggested by the *Triarchal Instruction Model,* behavioral and humanist perspectives should be integrated in order to meet the corresponding *objectives*. One of the approaches in literature that may fulfill two or three of the domains in objectives at one time is the *multiple intelligence* instruction proposed by Howard Gardner (1983). He argues that all people possess at least eight different intelligences that operate in varying degrees on the basis of each person's intelligence profile. Each teacher is challenged to provide multiple representations (to activate the most distinct intelligence of an individual) in terms of worthwhile activities that acknowledge individual differences in learners and develop all the other intelligences for all the learners of different intelligence profiles. For example, for learners who are extraordinary in linguistic intelligence to learn mathematics, the teacher will start instruction by activating the individual's language capacity as a vehicle of learning mathematics (i.e., ask these learners to compose a poem or a work of prose that may truly reflect the essence of a certain mathematical formula or equation), this exercise will be followed by activities involving other intelligences as multiple representations to promote other intelligences.

From the perspective of the *Triarchal Instructional Model*, the cognitive ingredient is demonstrated by the intelligence adopted and the promotion of other intelligences; the affective ingredient can be felt in the initial representation that fits into one's outstanding intelligence, which facilitates the feeling of meaningfulness, and thus become of great value to learners; the psycho-motor domain can be seemingly reflected by the representations of kinesthetic intelligence and natural observation intelligence in various instructional activities.

3.3. Three ingredients in teacher-student

In a given instructional setting, teachers may assume traditional roles as class leaders, directors, lecturers, or discussion leaders and contemporary new roles as instructional designers, trainers, collaborators, team coordinators, advisors, or evaluators (McGhee & Kozma, 2001). The Norwegian psychologist Ivar Bjørgen (Ljoså, 1997) proposed four different teacher roles: the *sculptor*, the *entertainer*, the *coach*, and the *manager*. From the

perspective of the *Triarchal Instruction Model*, these different teacher roles can be integrated in terms of behavioral, cognitive, and humanistic ingredients. Behavioral roles may cover directors, trainers, instructional designers, managers, and sculptors, and cognitive roles include lecturers, coaches, collaborators, discussion leaders, team coordinators, whereas humanistic roles have to do with advisors, evaluators, entertainers, and mentors.

For the convenience of introduction in this paper, *directors*, *facilitators*, and *stimulators* will be used to represent behavioral, cognitive, and humanistic teacher roles, respectively. Teachers as directors are involved in designing instructional materials, specific instructional procedures or steps, curriculum or materials, and specific feedback arrangement (reinforcement schemes). Next, teachers as facilitators may do things such as giving lecturers as in Ausubel's *meaningful learning* (1963), coaching students, as *scaffolding* in Bruner's *discovery learning* or as in Vygotsky's *social constructivism* (1978), and collaborating with learners (as in constructivism), leading discussions, and coordinating the team works. Lastly, teachers as stimulators are supposed to entertain students, give advice, conduct evaluations, and offer inspirations as mentors.

Again, what the teacher in the instruction settings should do depends on the nature of the other five components (i.e., *objective, assessment, student, material and method*) as well as the relative weights of each of the ingredients in correspondence with learners' levels of readiness. For instance, for the objectives in the cognitive domain, teachers are recommended to start by applying principles of behaviorism (e.g., *programmed instruction*, or *mastery learning*) to deal with what is basic (e.g., what is to be *remembered*), in which case teachers are mainly directors. Next, when moving to principles in cognitivism (e.g., Ausubel's *meaningful learning*, and Bruner's *discovery learning*) or constructivism (Vygotsky's *social constructivism* in the ZPD) to deal with what is related to *understanding* and *application*, teachers are facilitators. Lastly, when dealing with what is further up (more advanced subcategories), teachers are stimulators. The ingredients in Teacher-Student component are indicated in Figure 4 below.

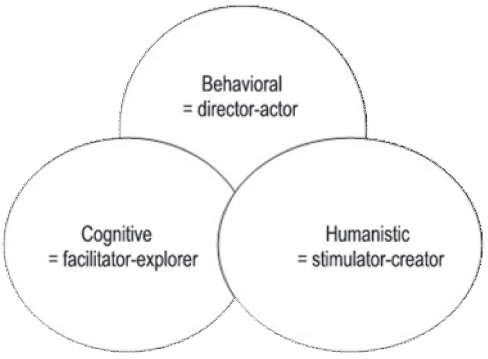

Figure 4. Three ingredients in the teacher-student component

It is helpful to use Gagne's *hierarchy of learning* as a framework to further elaborate the teacher roles in different learning situations. Specifically, Gagne's *signal learning*, *stimulus-response associations*, and *the chained associations* are mainly the focus of behaviorism, thus best dealt with by the teacher's role being that of director. The next few advanced stages in the hierarchy, *language, multiple discrimination, conceptual learning,* and *principle learning,* may, by assumption, move from behaviorism to cognitivism, and thus require the teacher's role to be that of facilitator. Similarly, the last stage of problem solving refers basically to humanism since it has to do more with the decision making of problem solving strategies, or relevant consideration of value systems, and thus call for the teacher's role to be that of stimulator. From another perspective, in consideration of the cognitive domain, teachers need to consider all the components involved in whole instructional settings, work out the optimal arrangement or organization of them, and play the roles of directors, facilitators, and stimulators at the same time yet with more weight on the role of facilitator. Next for the affective domain, according to the *Triarchal Instruction*

Model, what a teacher should do is act as stimulator by taking into consideration the individual differences and individual needs of learners–this may be done successfully through individualized instruction–or to act as facilitator by creating a cooperative or collaborative learning environment (e.g., open classrooms or various jigsaws) in which students may interact with people of various or diversified backgrounds. This is what social constructivists suggest, and it will not only promote positive affect but also contribute to cognitive and psycho-motor domains. Lastly, for the psycho-motor domain, the teacher may act as director by designing group activities in which all learners follow instruction and do as they are told. In sum, teaching is an art, and there are a variety of instructional alternatives for teachers to help learners reach the optimal results given that all the components involved in the instruction can be coordinated and organized, and the teacher roles may shift in between directors, facilitators, and stimulators as the learning conditions change.

As to the student component, **w**hat students should do in a given instructional setting also depends on the nature of the other five components (i.e., *objective, assessment, teacher, materials, and methodology*). First, as teachers may be directors, so may students be actors. Students will be allowed to display or act out their uniqueness and individual needs, which may include intelligence, motivation, aspiration, values, learning styles, learning strategies, temperaments, and personalities among others. Next, students shall also be explorers as teachers are facilitators. This can best be demonstrated in *discovery learning* where teachers offer students necessary learning material or information to facilitate students' discovery. Lastly, students can be creators as teachers are stimulators. We can see the behavioral, cognitive, and humanistic ingredients in students as actors, explorers, and creators, respectively.

In view of the cognitive domain in the objective component, initial knowledge or background knowledge of students in relation to what is to be learned should be activated, explored, and created. For this, learners can be provided with *advanced organizers* of the target material (Ausubel, 1978) with which students' previous relevant knowledge is integrated as an icebreaker. And then, through teachers' multiple representations of–or students' being encouraged or stimulated to represent–the target material based on students' unique intelligence as in the theory of *multiple intelligence* by Howard Gardner (1993), they can thus create some kind of understanding. For example, students of extraordinary kinesthetic intelligence can be induced to learn mathematics (e.g., the logic of triangular geometry) by being put in the sports field in which the concepts in mathematics are integrated with sports activities. The combination of what is already learned with what is yet to be learned is the key principle of learning. Such a principle can be applied to all the three objective domains.

With regard to the affective domain, as mentioned earlier, students' affective aspects are not independent of their cognitive and psycho-motor aspects; they are interdependent, with mutual reference of one another. That is, students' roles as actors, explorers, and creators are interdependent, and interchangeable in the course of learning. Specifically, if the preferred intelligence (as in *multiple intelligences*) of learners is induced in an instructional setting as explorers, then they will naturally feel interested and, stimulated, make sense of their learning, and be prompted to be creative.

Likewise the roles of actors, explorers, and creators can manifest in psycho-motor domain. Learners are prone to acting or are born to have the disposition of imitation especially toward things they like (as actors). Organizing activities of various kinds including field trips, field studies, dramas, plays, and group competitions can be very constructive and thus indispensable to learning because these activities match their disposition from infancy of playing, manipulating, or controlling things (as explorers).

4. Dynamic relationships in the instructional loop

In the *Triarchal Instructional Model*, there are various trinities in *components* (three pairs) in the instructional loop (*objective-assessment, teacher-student,* and *materi*al-*methods*) and trinities in *ingredients* within each component (behavioral, cognitive, and humanistic). One additional trinity involves levels of learner readiness *(beginner, intermediate, advanced*). Obviously, there are multiple dynamic relationships among the trinities. First, with regard to the three components, teacher-student, objective-assessment, and material-method must be treated interdependently. The objectives should be established by taking into account the individual differences of students as well as their levels of readiness, and the materials used to reach the objectives must also take into consideration student variables. Moreover, assessment must be carried out on the basis of objective specifications; teaching must also follow the tract of assessment as well as the methodology that matches the objectives. In short, the implementation of each single component must take into consideration the other two components. See Figure 5.

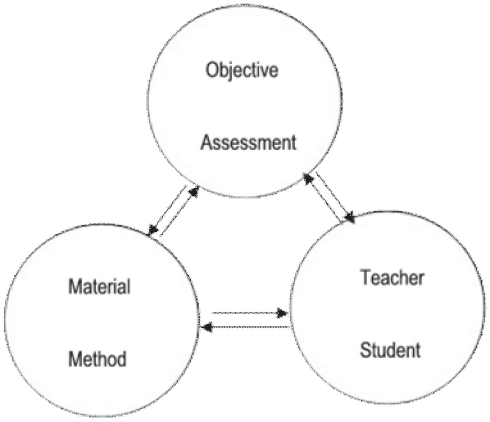

Figure 5. Dynamic relationships among the three pairs of components

Second, the relationship among behavioral, cognitive, and humanistic ingredients in each component can be considered as mutually embedded, with each inclusive of one another in different proportions. These three ingredients are not independent of one another, but rather any one ingredient may involve other ingredients in various proportions. What is cognitive may also encompass what is behavioral and humanistic, and likewise for the other ingredients. For example, learning material arranged and organized from simple to complex and from easy to difficult, as indicated in *programmed instruction,* is apparently behavioral, but it can also be humanistic in that such material is designed to be learner friendly, and in that way can better help learners achieve initial success, thus arousing learners' positive affects. On the other hand, materials may be so organized (as in *programmed instruction*) through the process of successive approximation that learners will gradually grasp the hidden rules or principles; that is what *neo-behaviorists* contend. An example is the use of the cognitive map proposed by Tolman (1922). The differences do not follow an all-or-none phenomenon that what is learned is either behavioral, or cognitive, or humanistic, but move along a continuum with different levels of each ingredient. See Figure 6 below.

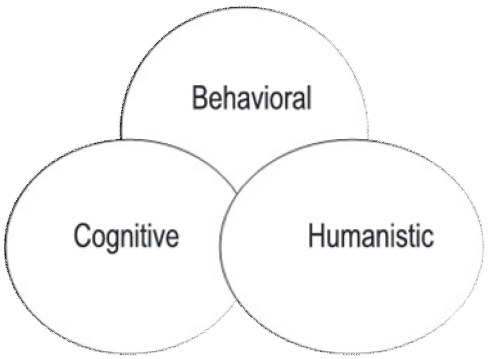

Figure 6. Three ingredients in a component

Next, with regard to levels of learner readiness, beginners may start from behavioral or humanistic modes in the three-pair components (objectives-assessment, teacher-student, and material-methodology), which is suggested by various schools of thought. In Piaget's cognitive developmental theory, organisms start from the sensory-motor

stage and continue through the pre-operational, concrete operational, to the formal operational. It seems that through behavioral manipulation/operation, one may acquire the schema necessary for advanced learning. Bruner's theory of representation also suggests the kinesthetic representation as the first stage, followed by iconic representation, and lastly, the symbolic representation. Behavioral oriented schools of thought such as that of Gagne, who speaks of a hierarchy of learning, also place the behavioral aspects as the first priority (*signal learning, S-R association, and chained S-R association*). It is also widely recognized that learners before puberty may prefer playing games as the dominant learning activity, and those after puberty may prefer activities (group processes), and for older learners, learning through group discussion/interaction is preferred. Thus, all these suggest behavioral ingredients as the focus for beginners. Specifically, objective-assessment should focus on *remembering, understanding, and application* (in the cognitive domain), on *receiving and responding* (in the affective domain), and *imitation and manipulation* (in the psycho-motor domain). On the other hand, for the intermediate level of learners, the focus will shift to *cognitive ingredients*. Again, in Piaget's cognitive developmental theory, the concrete operational and formal operational stages come after sensory-motor and pre-operational stages. In the last two stages, cognitive capacity plays an important role, and the ability of logical inference, inductive or deductive analysis, is required for further understanding. Bruner's theory of symbolic representation also refers to the cognitive aspects of learning. In Gagne's hierarchy of learning, what comes after *chained S-R associations* is the learning of language, multiple discrimination, concepts, and principles, all of which are more related to cognitive processing. As for advanced learners, the focus will be basically placed on humanistic ingredients of learning, which refers to value, aspiration, and self-actualization. Note that the idea of readiness (beginners, intermediate learners, and advanced learners) is not restricted to the competence level of learners, but rather applied to different stages of learning for an individual learner. It is also noteworthy that the clear-cut emphasis on different ingredients in terms of learners of different levels of readiness is only tentative, since it is also likely that beginners may start from humanistic ingredients (e.g., their individual needs or interests are considered), or cognitive ingredients (e.g., help them better understand what is learned through cognitive principles). Also it is a possibility that some learners may receive only one of the ingredients all the way in the course of instruction and manage to develop a capacity for the other ingredients. Apparently, the present model only serves as a guideline where learners of different levels of readiness are placed in the tentatively appropriate instructional settings in which all the components and the ingredients are taken into account. The dynamic relationships among the components, ingredients, and levels of readiness is discussed in depth below.

4.1. Level of readiness: beginner

For the objective component, the instruction focus at the beginner level of readiness should be on the first few items of each domain; that is, remembering, and understanding (cognitive domain), on receiving, and responding (affective domain), and on imitation, and manipulation (psycho-motor domain). Note that for the more fundamental sub-categories in each domain, because they are more behaviorally oriented, they can be thus more readily operationally assessed. The idea of the ZPD can be adopted in goal setting. Also note that the classification in each domain suggested above is only tentative; it is anything but clear cut.

For the assessment component, the adoption of criteria based assessment, rather than norm-referenced assessment, is suggested. The assessment in the cognitive domain must be implemented through a *taxonomy table* on *remembering,* and *understanding*, while anecdotal records, checklists, or rating scales on receiving and responding can be adopted for the affective domain. Authentic assessment, or performance assessment on imitation and manipulation, is appropriate for the psycho-motor domain.

For the teacher component, teachers use their expertise in directing, supervising, or advising learners. Teachers are advised to follow the principles of behaviorism (classical, operational, or social learning) in presentations or instruction management for all the three domains (e.g., programmed instruction based on classical or operant conditionings for *remembering* in the cognitive domain, social learning or behavior shaping techniques for *imitation*, and *manipulation* in the psycho-motor domain, and the combinations of the above techniques for *receiving, and responding* in the affective domain).

For the student component, learners are engaged in the learning under the teacher's guidance. They are exposed to the material presentations, learning activities, or games according to their individual learning styles, strategies, or habits. That is, learners will be given presentations of learning material in different formats such as verbal,

kinesthetic, spatial, or musical (as in Howard Gardner's multiple intelligences) to accommodate the learners' individual differences. It would be especially inspiring if the behavioral approaches (e.g., programmed instruction) could be coordinated with cognitive approaches (e.g., multiple intelligences) in helping beginners. Such combinations of instruction are humanistic because the individual differences of learners are attended to.

For the material component, the content of learning for beginners should be well organized in a way from simple to complex, from easy to difficult, and must be divided into a series of independent units to follow the principle of successive approximation. Besides, the material should cover more games or activities in pictorial forms (preferably comic strips), since friendly design may especially cater to the needs of beginners. Further, the material must specifically list what is to be learned on *remembering* and *understanding* in the cognitive domain. The games or tasks involved in learning must be carefully designed in order to motivate learners for *receiving* and *responding* in the affective domain and for the *imitation*, and *manipulation i*n the psycho-motor domain.

For the method component, the basic law of effective instruction for beginners is to help students combine what is old with what is new. The teacher may start from *programmed instruction* on the basis of principles of behaviorism. Such a method is especially applied to *remembering* in the cognitive domain, whereas the multiple presentations based on multiple intelligence is applied to understanding in the cognitive domain. In general, the approaches based on behaviorism, cognitivism, or humanism can all be applied for beginners, but with different weights, with more weight on behaviorist approaches, followed by cognitive approaches, and then humanistic approaches. (As mentioned earlier, any single approach, be it behavioral, cognitive, or humanistic, may claim to be capable of fulfilling the cognitive, affective, and psycho-motor domains.)

4.2. Level of readiness: intermediate

For the objective component, the instruction focus at the intermediate level of readiness should be on the middle items of each domain; that is, *applying* and *analyzing* (cognitive domain), on *valuing, organizing and conceptualizing* (affective domain), and on precision, and *articulation* (psycho-motor domain). Again, these intermediate sub-categories in each domain can be conceived as more cognitive oriented, so they can be more effectively achieved by cognitive approaches.

For the assessment component, either criterion-based assessment or norm-referenced assessment can be used. Like that mentioned for beginners, the assessment of intermediate learners in the cognitive domain must also be implemented through a *taxonomy table* on *applying* and *analyzing,* while affective tests (e.g., interest tests), or *rating scales* on *valuing, organizing and conceptualizing* can be adopted for affective domain, and dynamic or authentic assessment, or performance assessment on *precision and articulation* for the psycho-motor domain.

For teacher component, the role the teacher play may range from being directive (as in meaningful instruction), to being less directive (as in discovery learning). Teachers are recommended to follow mainly the principles of cognitivism/constructivism in presentations or instruction management for all three domains (e.g., meaningful and discovery instructions for *application and analysis* in cognitive domain, **s**ocial constructivism as in Vygortsky's scaffolding system (1978) for *precision, and articulation* in psycho-motor domain, and the combinations of the above techniques for *valuing, organizing and conceptualizing* in the affective domain).

For the student component, learners are engaged in learning under the instructional settings where knowledge construction, rule discovery, and solutions of problems can be achieved on the basis of the combinations of the unique experience and knowledge backgrounds of learners relevant to learning. That is, learners' individual learning styles, strategies, or habits will be incorporated with what is being learned, and eventually new knowledge or systems will be constructed to make what is learned meaningful.

For the material component, the content for intermediate learners should be arranged in a way that would facilitate learners' active engagement of the construction processes. The material should cover more problem-solving games or activities related to daily life (preferably unsolved problems), which will, in most cases, cater to the needs of intermediate learners in taking challenges. Further, the material must systematically include the concepts or principles necessary for problem solving on *application* and *analysis* in the cognitive domain. The problem-solving games or activities must be made interesting, significant, and meaningful to motivate or inspire

learners to be actively involved for the *valuing, organizing and conceptualizing* in the affective domain and for *precision and articulation* in the psycho-motor domain.

For the method component, the basic consideration of effective instruction for intermediate learners is to help students construct knowledge rather than just absorb what is taught as it is. The teacher may start from meaningful instruction on the basis of the principles of cognitivism, followed by discovery learning, and further elaborated by constructivist approaches. Likewise, the approaches based on behaviorism, cognitivism, or humanism can all be applied for intermediate learners, yet with different proportions; that is, more on cognitive approaches, followed by humanistic approaches, and then behaviorist approaches.

4.3. Level of readiness: advanced

For the objective components, the instruction focus for advanced learners should be on the last few items of each domain; that is, *creativity* (cognitive domain), on *characterizing by value or value concept* (affective domain), and on *naturalization* **(**psycho-motor domain**).** Note that the more advanced sub-categories in each domain, having more of a humanistic orientation, can be thus more effectively accomplished through humanistic modes of instruction. For one thing, the idea of qualitative transformation of our advanced mental competence as the ultimate objective of instruction (as in Vygotsky's system) can be adopted in goal setting.

For the assessment component, portfolio or other multiple assessments (such as *authentic and dynamic assessment*), rather than criteria based assessment or norm-referenced assessment, is suggested for advanced learners. The assessment on the cognitive domain (creativity) can be done by problem-solving tasks in real life, while self-statement inventory, or rating scales on *characterizing by value or value concept* can be adopted for the affective domain, and authentic assessment, or performance assessment on naturalization for the psycho-motor domain.

For the teacher component, the instructional role the teacher plays is to stimulate, motivate, or encourage learners. Teachers are advised to follow principles of humanism (e.g., in consideration of learners' individual differences and needs, offering learners unconditional regard and respect, genuineness, and empathy) in the course of instruction for all the three domains (e.g., open classroom based on humanist principles).

For the student component, learners are exposed to the instructional settings where their individual learning styles, strategies, habits, needs, aspiration, and expectations will be accommodated. That is, learners will be given maximum freedom or opportunities to learn, and their natural tendency toward self-actualization will be fulfilled, which can be reflected by their demonstrated creativity in the cognitive domain, by their demonstrated value concept in the affective domain, and by their demonstrated naturalization in the psycho-motor domain.

For the material component, the content for advanced learners should be made flexible and open to learners. In most cases, content at the advanced level should be, in most cases, the choice of the learners. Learners are allowed to make their own choice of learning material on the basis of their own individual needs and values. Any material may include real life issues, which may involve a variety of disciplines, and thus require coordinate teaching through the joint efforts of various teachers.

For the method component, **t**he basic principle of effective instruction for advanced learners is to help students become creative. The teacher may adopt cooperative or collaborative learning on the basis of principles of humanism or social constructivism (as in Vygotsky's system). In general, the approaches based on humanism can be applied as the first priority followed by cognitive approaches.

5. Validity of the model

This instructional model seeks to integrate three *ingredients* within all the *components* in instructional settings, but it is not without problems. First of all, it is hard to find a clear distinction among these ingredients. As mentioned earlier, each one ingredient may at the same time encompass the others; the cognitive ingredient is embedded in the behavioral ingredient, and likewise the humanistic ingredient is embedded in the cognitive or behavioral ingredients. Second, it is theoretically challenging that methods derived from distinct theories can be merged or concocted in a single model. For example, it may not be theoretically legitimate to give the initial application of *programmed instruction* (behaviorist approach), followed by the *discovery learning* (cognitive approach) since these two approaches are rooted from two distinct theories. In the cognitive oriented approach, what is basic (as is the focus of

the behavioral method) can be simultaneously dealt with in the cognitive oriented approach per se. That is, most cognitive theorists believe that learners can master what is basic through comprehending the underlying relationship of the elements of the basics. For example, one can easily memorize the atomic orders of chemical elements if the nature of the relationships among these elements is understood or comprehended in learning chemistry. It is reasonable to say that the three seemingly different ingredients (behavioral, cognitive, and humanistic) are, as assumed in the present model, interdependent and mutually inclusive and referenced.

Next, what predictions can be made about possible instructional outcomes according to the present model? We believe that success or failure of instruction can be illuminated by examining the dynamic relationships of the underlying components and ingredients within each component in the *Triarchal Instruction Model*. The effect of instruction can be predicted by the computation model mentioned above. For instance, if the objective-assessment component is not specified in a given instructional setting, chances are that the learning effect will not be satisfactory because there is a gap in the dynamic chains between the objective-assessment component and the other components. That is, to make instruction effective, each component shall be taken into account and be made to correspond and coordinate with others. Such logic also applies to ingredients (behavioral, cognitive, and humanistic) within each component; learning outcomes can be maximized when that the three ingredients are simultaneously taken into account or properly treated with optimal proportions according to the level of readiness of the learners as well as the dynamic relationships among other components.

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